US005463691A

United States Patent [19]

Nakae et al.

[11] Patent Number: 5,463,691

[45] Date of Patent: Oct. 31, 1995

[54] **EFFECT IMPARTING APPARATUS HAVING STORAGE UNITS FOR STORING PROGRAMS CORRESPONDING TO FORM AND EFFECT TO BE IMPARTED TO AN INPUT SIGNAL AND FOR STORING OUTPUT FORM PROGRAMS TO DETERMINE FORM OF OUTPUT SIGNAL WITH IMPARTED EFFECT**

[75] Inventors: **Tetsiochi Nakae**, Ome; **Kunihiro Matsubara**, Tokyo, both of Japan

[73] Assignee: **Casio Computer Co., Ltd.**, Tokyo, Japan

[21] Appl. No.: **132,139**

[22] Filed: **Oct. 4, 1993**

[30] **Foreign Application Priority Data**

Oct. 11, 1992	[JP]	Japan	4-297912
Dec. 15, 1992	[JP]	Japan	4-354145
Dec. 15, 1992	[JP]	Japan	4-354146

[51] **Int. Cl.**[6] **G10H 1/043**

[52] **U.S. Cl.** **381/61**; 381/62

[58] **Field of Search** 381/61–63; 84/625–626, 84/630, 629, 631, 622, 664

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,628,789	12/1986	Fujimori	381/62
4,864,625	9/1989	Hanzawa et al.	381/61
5,050,216	9/1991	Hanzawa et al.	381/62
5,073,942	12/1991	Yoshida et al.	381/61
5,218,710	6/1993	Yamaki et al.	381/61
5,272,274	12/1993	Kimura	381/63

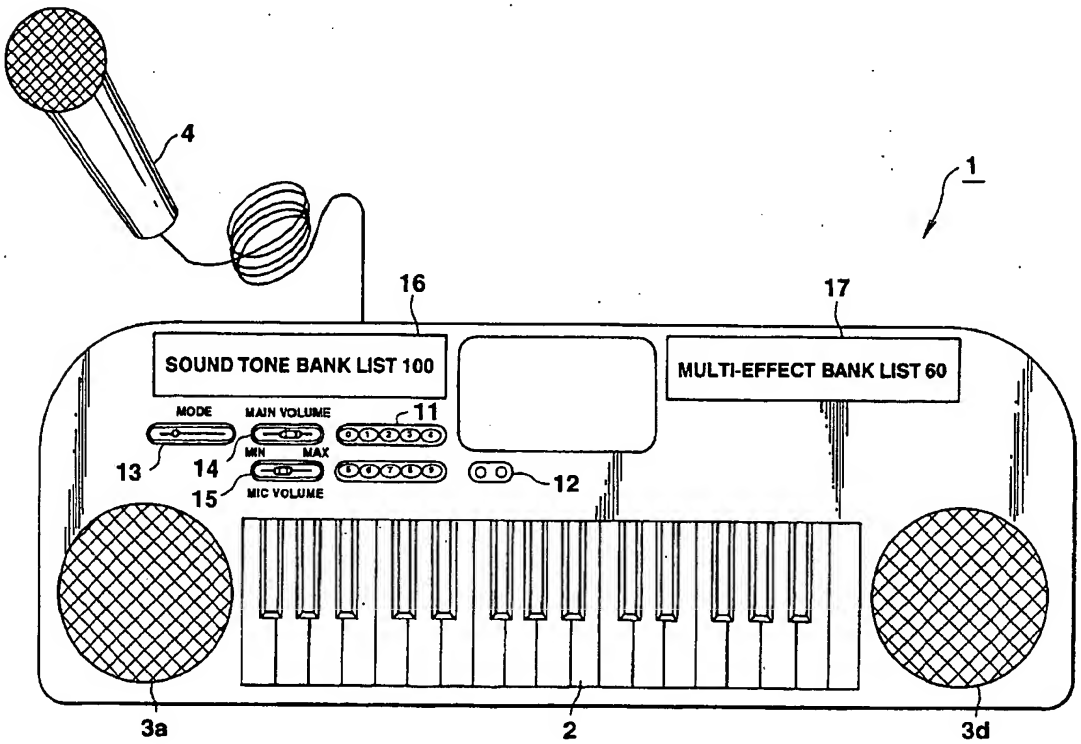
Primary Examiner—Stephen Brinich

Attorney, Agent, or Firm—Frishauf, Holtz, Goodman, Langer & Chick

[57] **ABSTRACT**

The kinds of effects imparted to signals received from a keyboard or a microphone are stored beforehand in a first and a second effector. An effect (1) input selector and an effect (2) input selector set forms in which signals are fed to the respective effectors. A direct tone control switch, and effect (1) and (2) L/R switches set a form in which the signal with an imparted effect is output. The input forms of those signals, the kinds of effects and the output form of the signals with an imparted effect are displayed on a list display. The user operates a ten-key unit to select a desired input and output forms of the signals and the kinds of effects to be imparted to the signal while viewing the list display.

20 Claims, 24 Drawing Sheets



US-PAT-NO: 5463691

DOCUMENT-IDENTIFIER: US 5463691 A
See image for Certificate of Correction

TITLE: Effect imparting apparatus having storage units for storing programs corresponding to form and effect to be imparted to an input signal and for storing output form programs to determine form of output signal with imparted effect

---------- KWIC ---------

Application Filing Date - AD (1):
19931004

Detailed Description Text - DETX (44):
At step S60 it is determined whether a high release envelope is "0". This envelope is used for **attenuating** the level of a signal at high speed, for example, when the effect is changed to another. Thus, when the high release envelope is "0" at step S60, it is determined that the effect is required to be changed. Thus, control passes to step S62 to change the effect. When the high release envelope is not "0", control returns to step S12 to repeat processing similar to the above.

Detailed Description Text - DETX (65):
FIG. 19 is a front view of a microphone device with an effect imparting apparatus (digital effector) according to the present invention. FIG. 20 is a side view of the microphone device. In FIGS. 19 and 20, reference numeral 101 denotes a colorful microphone **device body** made, for example, of a resin material. The microphone body 101 has an upper cylindrical portion to an upper end of which a microphone 102 is provided. The microphone 102 is non-directional so that two persons's voices in a duet are conveniently input through the microphone device. The microphone 102 is covered with a soft material such as sponge (not shown).

Detailed Description Text - DETX (66):
The microphone body 101 takes the form of a solid having a horizontal substantially triangular cross section as a whole and has a pair of elliptical speakers 103a, 103b on a front thereof. These speaker 103a, 103b produce in two directions performance outputs containing a voice from the microphone. The microphone **device body** 101 has a pair of handles 104 (one handle alone is shown) such that a singer who sings a song to a recorded orchestral accompaniment melody grips any one of those handles 104 so as to support the microphone **device body** 101. The reason for provision of the pair of handles is that, for example, two singers in a duet can grip those handles in both directions.

Detailed Description Text - DETX (67):
The microphone **device body** 101 is fixed at its upper cylindrical end to a

panel base 106, which takes the form of a solid having a horizontal substantially triangular cross section. The panel base 106 has an operation panel 107, the details of which are shown in FIG. 21. In FIG. 21, the operation panel 107 is provided with a power supply/mode switch 111, a volume 112, a power supply/mode display lamp 113 and a select key unit 114.

Detailed Description Text - DETX (68):

The power supply/mode switch 111 used is of the type which slidable horizontally. The power supply/mode switch 111 has an "OFF" position (a power supply for the microphone **device body** 101 is turned off at the "OFF" position and on at any other position); a position "THRU" where the original signal without any effects is passed through the apparatus; a position "2PUSH" where a key of the select key unit 114 is pushed twice for selection of the corresponding mode; and a position "1PUSH" where a key of the select key unit 114 is pushed once for selection of the corresponding mode.

Detailed Description Text - DETX (69):

The volume 112 is of the type which is slidable horizontally to **adjust the output level of the speakers** 103a, 103b. The power supply/mode display lamp 113 is lighted depending on the selected state of each mode and the slide position of the power supply/mode switch 111. The select key unit (select means) 114 has 8 keys "1"-"8", depression of any one or two of which selects the number of an effect imparted to the input signal (in this case, from the microphone). The select key unit 114 selects one from a plurality of effects as in the previous embodiment and stored beforehand as "EFFECT BANK" in the form of programs. In the second embodiment, no effect name No. list display is provided, but such display may be disposed at a predetermined position in the microphone **device body** 101 or may be affixed to a manual for this apparatus.

Detailed Description Text - DETX (70):

The microphone **body 101 has a terminal** panel 121 on one side thereof. The terminal panel 121 is provided thereon with a microphone input jack 122, a headphone output jack 123 and a power supply jack 124 as shown in detail in FIG. 22 on an enlarged scale. The microphone input jack 122 is used to connect an external microphone thereto. For example, when two persons sing a song in a duet at a place remote from the microphone **device body** 101, a plug of the external microphone is inserted into the microphone input jack 122 so that a different voice from that of the microphone 102 can be input into the microphone device. The headphone output jack 123 is used to connect a headphone thereto. When a plug of the headphone is inserted into the headphone output jack 123, the speakers 1, 103a and 103b stop producing sounds and instead, the headphone receives an signal input thereto.

Detailed Description Text - DETX (71):

The power supply Jack 124 receives a plug of an external power supply, for example, of DC 9 volts. The microphone **device body** 101 is provided with an internal power supply, for example, of a dry cell which normally supplies required operating power to the elements concerned.

Detailed Description Text - DETX (72):

FIG. 23 is a block diagram of an effect imparting apparatus provided to the microphone **device body** 101. In FIG. 23, the effect imparting apparatus is provided with an effect select switch unit 114(corresponding to the

above-mentioned select key); an amplifier 131; a low pass filter 132; an analog-to-digital converter 133; a DSP 134; a data ROM 135; a work RAM 136; a bus 137; a digital-to-analog converter 138; and an output unit 139.

Detailed Description Text - DETX (86):

The third embodiment of the present invention is a microphone device as in the second embodiment and different from the second embodiment in that the former embodiment has a display on which the result of the selection by the select key unit 114 is displayed. FIG. 25 is a side view of the microphone device in which an operation panel 207 having a structure different from that of the second embodiment is disposed on a panel base 106 of the microphone **device body** 201 (The details of the operation panel 207 are shown in FIG. 26). The other remaining structure of the third embodiment is similar to that of the second embodiment and the same reference numeral is used to denote the same element in the Figures corresponding to each other.

Detailed Description Text - DETX (88):

FIG. 27 is a block diagram of an effect imparting apparatus provided to the microphone **device body** 201. In FIG. 27, the DSP 134 is connected to the liquid crystal display 210. It commands the display 210 to display thereon a numeral corresponding to the result of the selection of a switch of the effect select switch unit 114. Thus, the display 210 displays a corresponding numeral of one or double figures. The third embodiment is substantially similar to the second embodiment and uses in the Figures the same reference numeral as the second embodiment.

Detailed Description Text - DETX (91):

The fourth embodiment uses an input signal from a tape recorder as an example. FIG. 28 shows the appearance of a microphone device to which the inventive effect imparting apparatus (digital effector) is applied. In FIG. 28, reference numeral 301 denotes a colorful effect microphone **device body** with a built-in tape recorder 302 and for example, the main part of the **device body** is made of a resin material. The tape recorder used may be of the type where a cassette tape of a regular or miniaturized size is used.

Detailed Description Text - DETX (92):

The effect microphone **device body** 301 has a non-directional microphone 303 covered with a soft material such as sponge. The effect microphone body 301 is composed of a solid having a horizontal substantially trapezoidal cross section as a whole. It has on its front a circular speaker 304, which produces an effect output containing a microphone voice forwardly. The effect microphone **device body** 301 has a handle 305 on one side thereof and having such a size that it is easily gripped by a hand of the user so as to be supported and carried.

Detailed Description Text - DETX (93):

The effect microphone **device body** 301 has various switches disposed on the other side thereof. More specifically, the switches are a power supply switch 311 to turn on/off power to the effect microphone body 301; a play switch 312 to operate the tape recorder 302; a rapid feed switch 313 to feed a tape rapidly; a tape rewinding switch 314; a stop switch 315 to stop the operation of the tape recorder 302; and a volume (not shown) to adjust the volume of the speaker 304.

Detailed Description Text - DETX (94):
The effect microphone **device body** 301 has an effect select switch unit 320 on the front thereof and having 7 keys 320a-320g, one or two of which can be depressed to select the number of an effect imparted to the input signal (in this embodiment, a microphone signal). The respective keys 320a-320g of the effect select switch unit 320 may be lighted themselves or display the corresponding numerals "1"-"7" thereon, when depressed.

Detailed Description Text - DETX (95):
The effect select switch 320 selects a desired one from a plurality of effects as in the previous embodiments and stored beforehand as "EFFECT BANK" in the form of programs. In the fourth embodiment, no effect No. list display is provided, but such display may be disposed at a predetermined position in the effect microphone **device body** 301 or may be affixed to a manual for this apparatus. The effect microphone body 301 has an internal power supply (for example, a cell), which normally supplies required operating power to the elements concerned. Alternatively, it may have an external power supply terminal thereon.

Detailed Description Text - DETX (96):
FIG. 29 is a block diagram of an effect imparting apparatus provided to the effect microphone **device body** 301. In FIG. 29, the effect imparting apparatus is provided with an effect select switch unit 20; an amplifier 331; low pass filters 332, 333; analog-to-digital converters 334, 335; a DSP 336; a data ROM 337; a work RAM 338; a bus 339; a digital-to-analog (D/A) converter 340; and an output unit 341.

Detailed Description Text - DETX (106):
The fifth embodiment uses an input signal from a CD (Compact Disk) reproducing device as an example. FIG. 30 shows the appearance of a CDed effect microphone to which the inventive effect imparting apparatus (digital effector) is applied. In FIG. 30, reference numeral 401 denotes a colorful CDed effect microphone **device body** and for example, the main portion of the body is made of a resin material. The microphone body 401 includes a built-in CD reproducing device 402. The reproducing device may be, for example, of either a regular or a miniaturized size.

Detailed Description Text - DETX (107):
The effect microphone **device body** 401 has a non-directional microphone 403 covered with a soft material such as sponge. The effect microphone **device body** 401 is composed of a solid having a horizontal substantially elliptical cross section. It has on its front a circular speaker 404, which produces an effect output containing a microphone voice forwardly.

Detailed Description Text - DETX (108):
The effect microphone **device body** 401 has an effect select switch unit (select means) 410 at substantially the center thereof and having 6 keys 410a-410f, one or two of which can be depressed to select the number of an effect imparted to the input signal (in this embodiment, a microphone signal). The respective keys 410a-410f of the effect select switch unit 410 may be lighted themselves or display the corresponding numerals "1"-"6" thereon, when

depressed.

Detailed Description Text - DETX (109):

The effect select switch unit 410 selects a desired one from a plurality of effects as in the previous embodiments and stored beforehand as "EFFECT BANK" in the form of programs. In the fifth embodiment, no effect No. list display is provided, but such display may be disposed at a predetermined position in the effect microphone **device body** 401 or may be affixed to a manual for this apparatus. The effect microphone **device body** 401 has an internal power supply (for example, a cell), which normally supplies required operating power to the elements concerned. Alternatively, it may have an external power supply terminal thereon.

Detailed Description Text - DETX (110):

The effect microphone **device body** 401 is provided with various operation switches, for example, including a power supply switch, a switch for starting/stopping a CD 402, a rapid feed switch, a volume for adjusting the volume of the speaker 404, etc., although not shown.

Detailed Description Text - DETX (111):

FIG. 31 is a block diagram of an effect imparting apparatus provided to the CDed effect microphone **device body** 401. In FIG. 31, the effect imparting apparatus is provided with an effect select switch unit 410; an amplifier 431; a low pass filter 432; an analog-to-digital converter 434; a DSP 436; a data ROM 437; a work RAM 438; a bus 439; a digital-to-analog converter 440; and an output unit 441.